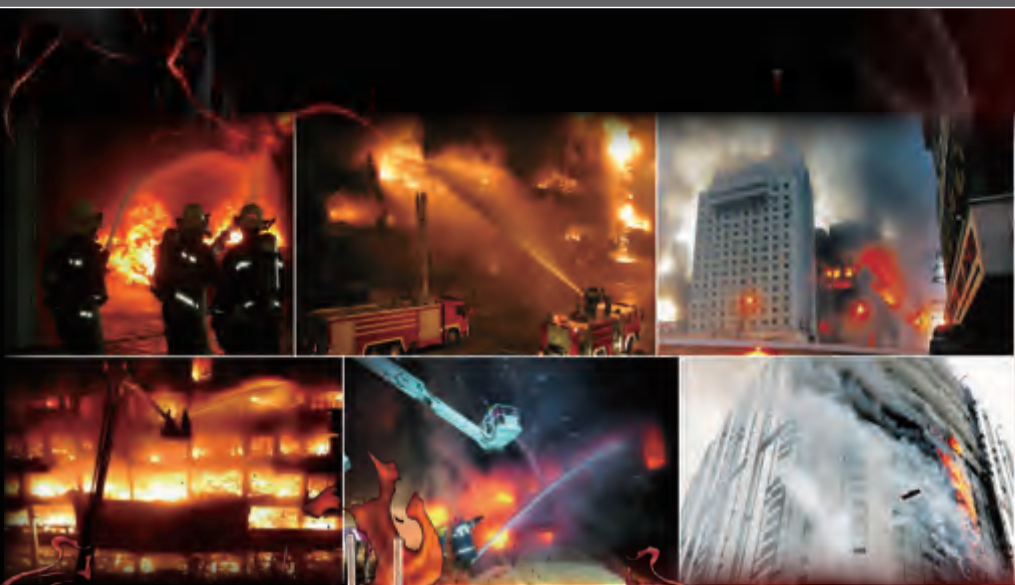




# MICC Wiring Cable System



**Fire  
Survival**

**Mineral Insulated Cable Co., Ltd.**

A night photograph of a building on fire. The sky is dark blue with a full moon in the upper right. The building is silhouetted against the dark sky, with a large plume of orange and yellow fire and smoke rising from the base. The building's facade has a diamond-patterned texture.

## “Ask yourself this question-

It is 3am in the morning

You are in a foreign country

On the top floor of a 40 storey Hotel

It is your first night in the Hotel

You're tired and fall asleep

Suddenly you wake up and can smell smoke

Which building would you like to be in?

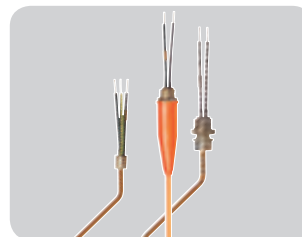
One with the FIRE ALARM – SMOKE DETECTORS –  
SPRINKLERS - EMERGENCY LIGHTING and  
VENTILATION

wired in the MICC Fireproof wiring system

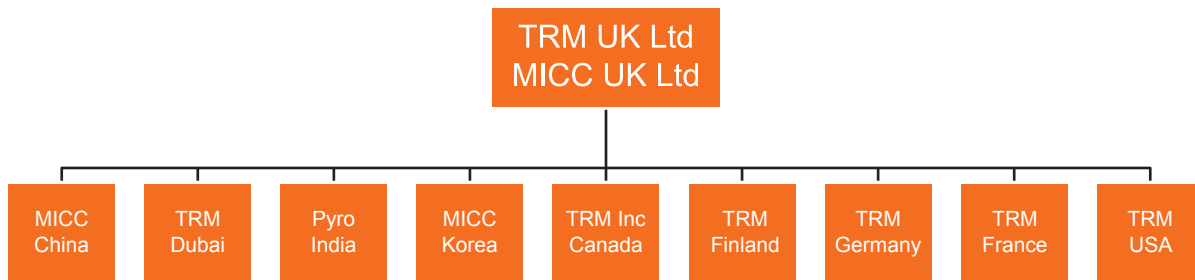
Or ?

Ask yourself the question”

# contents



<b>ABOUT US</b>	<b>2</b>
<b>INTRODUCTION</b>	<b>3</b>
<b>CHARACTERISTICS</b>	<b>5</b>
<b>BS 6387 - The Facts</b>	<b>7</b>
<b>MANUFACTURING PROCESS</b>	<b>9</b>
<b>APPLICATIONS</b>	<b>11</b>
<b>CABLE REFERENCE SYSTEM</b>	<b>14</b>
<b>CABLE DATA</b>	<b>15</b>
<b>STANDARD AND APPROVALS</b>	<b>17</b>
<b>MICC TWISTED COMMUNICATION CABLES</b>	<b>19</b>
<b>ACCESSORIES</b>	<b>21</b>
<b>ALLOY 825 SHEATHED FIRE-PROOF WIRING CABLE</b>	<b>23</b>
<b>PROJECT REFERENCES</b>	<b>27</b>



## ABOUT US

### THE MICC & TRM GROUP OF COMPANIES WAS FORMED BY EX-EMPLOYEES OF BICC CABLES IN 2001.

The directors and owners of the MICC and TRM businesses have all worked for BICC mineral insulated (MI) wiring cable companies for more than 30 years and bring to the industry over 300 years of cumulative experience, knowledge and enthusiasm required by our customers.

Our quality system is certified to ISO 9001:2008 accreditation and our MI wiring cables are manufactured to meet BSEN60702:2002. Our MI wiring cables meet the requirements for LPCB certification, specifically BS6387 and have also been independently tested to achieve the CWZ standard in three separate tests on the same piece of cable.

We hold many approvals and certificates (hazardous area and country specific approvals) for our product range – please contact us with any questions concerning certifications.

Our global headquarters is based in Washington, Tyne & Wear, UK. We are proud to be a North East business and are North East England ambassadors, helping strengthen the regions image and supporting local global business relationships.

We also have manufacturing plants, sales offices and installation teams in USA, Canada, Germany, France, Finland, Russia, Mideast, Korea, India and China. In addition to this we have many partners and agents around the world.

We specialise in making all types of MI cable and finished products (thermocouples, RTDs and heating elements to name but a few) and look forward to providing you with our products, we will provide a personal touch and level of service not available from other organizations with other interests.





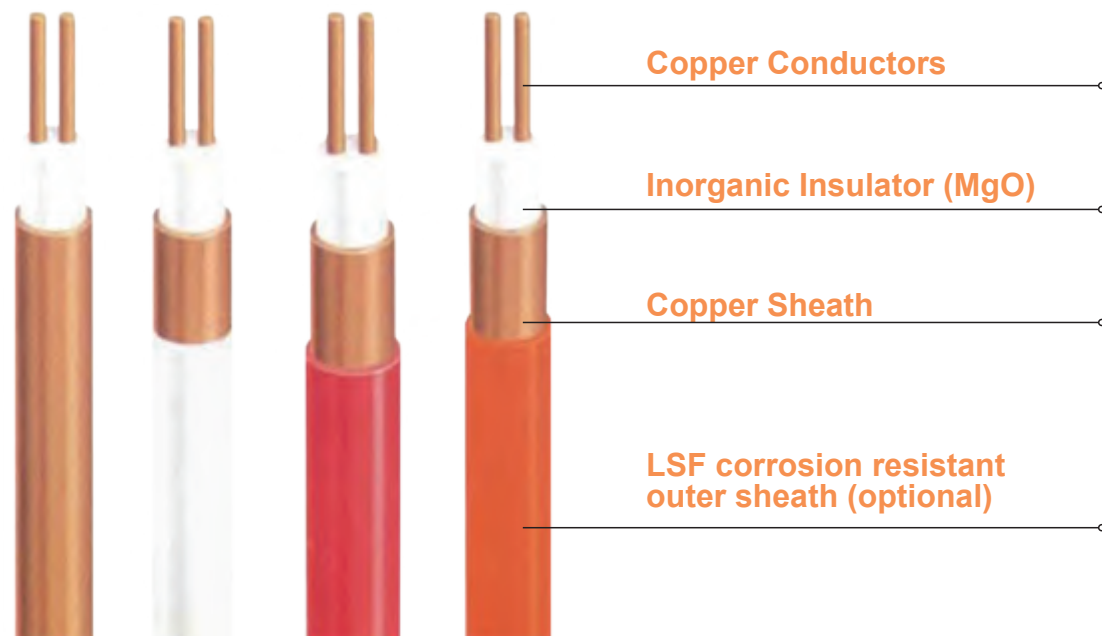
## INTRODUCTION

What is the most important function of installed wiring when a fire occurs?

Simply put, first the preservation of life and secondly the property.

Will emergency and essential circuits such as escape lighting, fire sensors, fire alarm circuits, service lifts, water pumps, smoke extractors continue to function both during the building evacuation and the fire fighting effort?

It is the performance of the mineral insulated fire-proof wiring cable which can provide this essential function. Traditional plastic cables can overload due to short circuits or damage from falling objects bringing further large amounts of smoke and toxic gases. As outlined in the NES713 standard, HCL toxicity levels of 500ppm can cause fatalities within 30 minutes and COCL<sub>2</sub> toxicity levels of just 25ppm will also cause fatalities. In addition, HCL corrodes expensive computer networks and equipment. Even low smoke halogen-free (LSZH) cabling, after a number of fire research institute investigations, show it is not much better than traditional cable.



The mineral insulated fireproof wiring cable which has been developed by experts in MICC is an inorganic cable. The use of inorganic materials in the construction of the cable eliminates the production of smoke and poison gas during a fire. It also provides for an extremely mechanically strong cable which can withstand falling objects and water spray. In the environment which is full of heavy acrid smoke MICC fireproof wiring cable increases and enhances the chances that people will escape safely. It is particularly suitable for underground constructions such as road tunnels, vehicle parking and cable tunnels. It is also highly recommended and in some cases covered by local or national standards for installation in train stations, airports, docks, theaters and other high

occupancy locations such as public buildings, art galleries and museums.

In 1996, a train fire occurred in the English channel tunnel which connects Britain and France (length approximately 50km). The mineral insulated fireproof cable providing power to the emergency lighting continued to function during the intense fire conditions which gave valuable time for people to evacuate and escape through the service tunnels.

MICC mineral insulated (MI) Cable is composed of inorganic materials namely a copper conductor or conductors, mineral insulation – magnesium oxide (MgO) and the copper sheath. As stated in the IEC228 standard, the melting point of the copper conductor and sheath is 1083 °C. The melting point of the high purity MgO is 2800 °C. MI cable will continue to function reliably in environmental temperatures up to 1000°C. This is the unique ability of MI wiring cable over that of the traditional wiring cable. For some special applications (installation in concrete or to match the colour scheme of a building) we can serve the outer of the MI cable with an LSF sheath to your colour requirements.

“UL has recently conducted research on a wide array of current products and systems originally certified under UL 2196, Tests for Fire Resistive Cables and ULC-S139, Standard Method of Fire Test for Evaluation of Integrity of Electrical Cables and determined that they no longer consistently achieve a two-hour fire-resistive rating when subjected to the standard Fire Endurance Test of UL2196 or ULC-S139. Consequently, UL and ULC will not be able to offer certification to the currently existing program related to these standards. (UL began certifying these systems under the above referenced standards in 2000)

As a result, manufacturers are no longer authorized to place the UL mark or ULC mark on the following products:

- UL Classified Fire Resistive Cable (FHJR)
- ULC Listed Fire Resistant Cable (FHJRC)
- UL Listed cable with "-CI" suffix (Circuit Integrity)



Furthermore, UL has removed from its certification directory all Electrical Circuit Protective Systems constructed with Fire Resistive Cable (FHIT).”

—UL Public Notice released on September 12, 2012

**MICC MI cable is a stand-alone product, contains no polymer, uses no zinc, and does not require conduit protection. It is unaffected by the issues associated with cable-in-conduit systems and there have been no changes to the product that has consistently met the requirements for a two-hour fire resistive system when tested to UL 2196 and ULC- S139.**



## CHARACTERISTICS

### Fireproof

MI Cable will not burn, or support combustion. By continuing to function when exposed to fire, it maintains vital emergency services. The inorganic bare cable will not emit smoke, toxic gas or propagate flame.

### Inherent Flameproof Barrier

MICC MI Cable has a solid construction with a non-flammable sheath. The highly compacted insulant will resist the transmission of vapours, gases or flames between items of equipment connected by the cable. See BS 5345 Part 1 Clause 25.4.

### Wiring Cable and Conduit Combined

The cable sheath provides an excellent earthing medium and core protection, yet the overall diameter is smaller than other types of cables with equivalent current ratings and it is sufficiently pliable to permit intricate routing.

### Mechanically Strong

The cable also withstands considerable abuse such as bending, flattening and twisting, without electrical failure. It is also resistant to rodent attack.

### Non-Ageing

MICC MI Cable is permanent and will not degrade with age as its sheath, conductors and insulation are for all practical purposes indestructible and completely stable. Hence the cable can be removed and re-used many years after initial installation, with subsequent savings in re-wiring costs.

### Pliable

MICC MI Cable is fully annealed and consequently extremely malleable, enabling it to be easily bent to follow intricate shapes without detriment to its electrical characteristics.

### High Corrosion Resistance

MICC MI Cable, with its copper sheath, has a high resistance to corrosion and for all normal environments needs no additional protection. Where it may be exposed to chemicals specifically corrosive to copper, cables with an LSF protective outer covering are available.



**Waterproof**

MICC MI Cable has a metal sheath which is impervious to water, oil and gas.

**MI With Small Overall Diameter**

MICC MI Cable have much smaller diameter than other types of cables with equivalent current ratings. This ensures a neat installation with no deep chasing in walls. A thin layer of plaster can accommodate the cable or it can be run inconspicuously on the surface.

**Excellent Earth Continuity**

The copper sheath eliminates the need for a separate circuit protective conductor. The excellent low resistance copper sheath conforms to the requirements of the IEE Wiring Regulations (BS7671).

**High Operating Temperature**

Bare copper sheathed MICC MI Cables withstand continuous operating temperatures up to 250°C, although the cable can be operated for periods up to temperatures approaching the melting point of copper (1083°C).

**Radiation Resistance**

MICC MI Cables are eminently suitable for installation in nuclear radiation environments because of their inorganic construction.

**Competitive Installed Cost**

MICC Cable eliminates the cost and potential structural damage caused by repair and replacement work associated with other cable types. It also prevents the disruption to business operations through the need for building closure to allow such work to take place

**Zero Energy**

Bare cable will not contribute to the energy of a fire. A thin LSF outer covering offers minimal fuel to a fire situation.

**High Degree of Electrical Screening**

The solid copper sheath of MICC MI Cables provides an excellent electrostatic screen. In addition, it also maximises electromagnetic compatibility (EMC), enabling the cable to be installed with minimum separation from other cables. For specialised data communication applications, cables with twisted conductors are also available.



## BS 6387 - THE FACTS

### The title of the standard is:

Specification for performance requirements for cables required to maintain circuit integrity under fire conditions.

The standard's purpose is to determine a cable's ability to function under differing conditions of:

- Fire;
- Fire with water spray;
- Fire with mechanical shock.

There are three tests in the standard to comply with BS 6387:

### 1. Resistance to Fire

The cable is tested by exposure to gas burner flames while passing a current at its rated voltage. Four survival categories are defined in the Performance Table below.

PERFORMANCE TABLE		
	Symbol	MI cable
650°C for 3 hours	A	Exceeds
750°C for 3 hours	B	Exceeds
<b>950°C for 3 hours</b>	<b>C</b>	<b>Exceeds</b>
950°C for 20 minutes	S	Exceeds



### 2. Resistance to Fire with Water Spray

The cable is again exposed to flames at 650°C for 15 minutes whilst passing a current of 250mA at rated voltage and then the spray is turned on to give exposure to both fire and water for a further 15 minutes. A single survival category is defined in the Performance Table below.

MICC		
	Symbol	MI Cable
<b>650°C</b>	<b>W</b>	<b>Exceeds</b>



### 3. Resistance to Fire with Mechanical Shock

The final requirement is mechanical shock damage. The cable is mounted on a backing panel in an S-bend and is exposed to flames whilst the backing panel is struck with a solid steel bar the same diameter as the cable under test every 30 seconds for 15 minutes. Whilst the cable has been exposed to temperatures as defined in the Performance Table below.

PERFORMANCE TABLE		
	Symbol	MI cable
650°C	X	Exceeds
750°C	Y	Exceeds
<b>950°C</b>	<b>Z</b>	<b>Exceeds</b>



### Conclusion

MICC MI Wiring Cable meets the requirements of BS6387 to standard CWZ and **what is more important is it can meet these requirements with 1 sample of cable not 3 samples as allowed in the standard**

If cables subjected to the BS 6387 series of tests are allowed to be conducted using a different cable each time then doubt on its true 'real world' performance must be raised.

The only fire proof wiring cable to exceed the requirements of each test on the same piece of cable is Mineral Insulated Cable as supplied by MICC group.

### LPCB Approval

MICC group is proud to be certified by LPCB and listed in the LPCB Red Book [www.redbooklive.com](http://www.redbooklive.com). LPCB stands for Loss Prevention Certification Board – a certification brand of BRE Global Limited. LPCB is the approval brand operated by BRE Global for fire and security products and services. LPCB certification is recognized by many design consultancies, specifiers and designers worldwide as an indication of product quality and conformance to internationally recognised fireproof and fire resistant testing standards. In addition to our MI Wiring Cable range being tested and approved by LPCB laboratories LPCB also carries out surveillance audits on our factories to ensure product standards are maintained.



# MANUFACTURING PROCESS

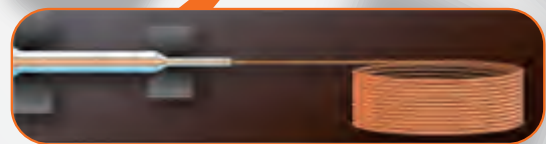


MgO



Block Production

Cable Reduction



Annealing



Water Immersion Test





MgO Blocks Fired



Conductor

Start Cable



Seamless Tube

Electrical & Mechanical Test

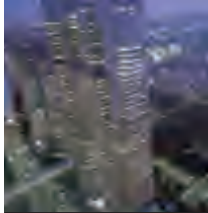


Drumming & Shipment





## APPLICATIONS



### High rise buildings

Rising main and lateral distribution systems,  
Under-floor mains distribution systems,  
Perimeter, feature & security lighting.

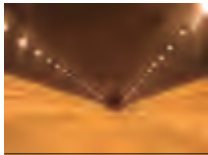
---



### Metro Links

General lighting, Emergency lighting,  
Fire protection systems.

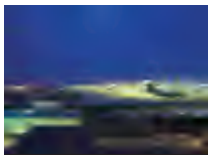
---



### Rail & Road Tunnels

General lighting, Emergency lighting, Fire detection,  
Fire telephones, Fume & ventilation systems.

---



### Airports

General lighting and power, Emergency lighting,  
Fire protection systems, Public address.

---



### Hotels

General lighting and power,  
Fire alarm system,  
Emergency lighting, bedroom lighting and power.

---



### Hospitals

General lighting and power, Fire alarm system,  
Emergency lighting.

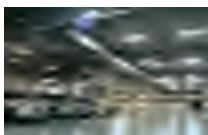
---



### Shopping Complexes

General lighting and power, Emergency light,  
Fire and Security circuits, Public address.

---



### Car Parking

General lighting, fire alarm system,  
Emergency lighting system, Exhaust fume extraction, Security cameras.

---



### Petrol Stations

Pump circuits, Fire alarm and security circuits,  
General lighting.

---



### Escalators

Emergency stop start controls,  
Fire detection and smoke extraction.

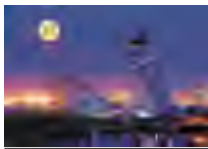
---



### Transport interchanges

Public lighting, fire alarm, Emergency lighting,  
Public address, destination and display indicators and signage.

---



### Dock and Harbour

General lighting and power,  
Fire protection and emergency lighting systems.

---



### Scenic Spots and Historical Sites

General lighting and power, Emergency lighting,  
Fire alarm and security systems, Mains distribution.

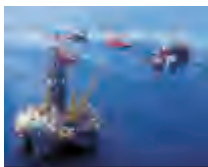
---



### Power Generating

General lighting and power, Emergency lighting,  
Fire alarm and security systems,  
Emergency shutdown circuits.

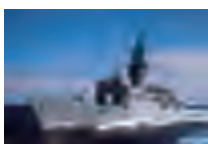
---



### Offshore

High integrity circuits,  
Accommodation blocks.

---



### Ship or warships

General lighting, Emergency lighting,  
Fire detection.

---



### Petrochemicals

Wiring in potentially explosive atmospheres,  
General and emergency services.

---



### Ferrous Metallurgy

General and emergency services,  
Wiring in potentially explosive atmospheres.

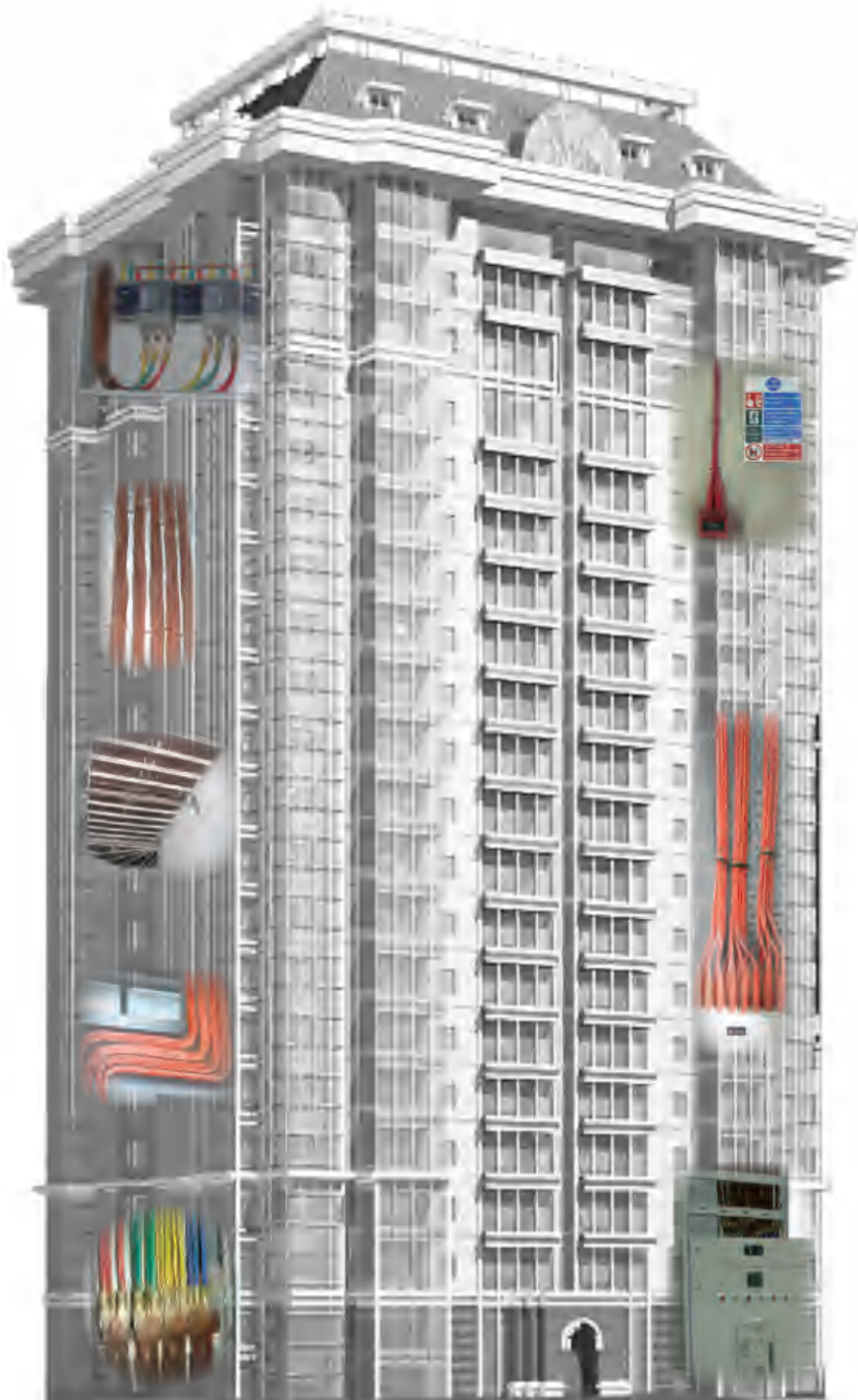
---



### Nuclear Stations

General lighting and power,  
Emergency lighting,  
Fire alarm and security systems.

---





## CABLE REFERENCE SYSTEM

CC = Bare Copper Sheath.  
 M = LSF Covering.  
 2 = No. of Conductors.  
 L = 500V Rating.  
 H = 750V Rating.  
 2.5 = cross sectional area (sq mm) of  
 each Conductor followed by colour of  
 LSF Covering.

e.g.

1. CC 2L2.5
2. CCM 2L2.5 Red
3. CCM 2H6 Orange

### Data

Copper sheathed MICC Cable with or without a plastic outer covering complies with the requirements of IEC 60702.

### Test Voltage

All cables are tested in accordance with IEC 60702.

i.e.

500V Cables - 2.0kVAC or DC equivalent.

750V Cables - 2.5kVAC or DC equivalent.



### Material

#### CONDUCTORS

Copper complying with BS EN 1976 designation Cu-ETP-2 and the appropriate requirements of BS 6360.

#### INSULATION

Compressed Mineral Insulant(MgO).

#### SHEATH

Phosphorus de-oxidised copper, type Cu-DHP to BS EN 1976.

#### CORROSION PROTECTIVE COVERING

The LSF covering complies with the requirements of IEC 60702.



# CABLE DATA

CABLE SIZE REFERENCE BARE CABLE CC LSF COVERED CCM	NUMBER & CROSS SECTIONAL AREA OF CONDUCTORS	CURRENT RATINGS		VOLT DROP		CABLE DIAMETER		APPROXIMATE NOMINAL CONDUCTOR DIAMETER	CORE RESISTANCE	COPPER SHEATH SECTION	COPPER SHEATH RESISTANCE	APPROXIMATE LONGEST COIL LENGTHS FOR ESTIMATING PURPOSES	COIL DIAMETERS		APPROX. WEIGHT PER 1000M	
		LSF	BARE	PER AMP PER METRE	LSF	BARE	LSF						BARE	LSF	BARE	
FOLLOWED BY	No. x sq mm	amps**	amps**	mV**	mm	mm	mm	Ohm/km	mm <sup>2</sup>	Ohm/km	m	mm	mm	kg	kg	
<b>LIGHT DUTY 500V GRADE</b>																
2L1	2x1	19.5	17.5	42	6.6	5.1	1.13	17.24	6.04	2.85	1800	1200	125	104		
2L1.5	2x1.5	25	22.5	28	7.2	5.7	1.39	11.49	7.12	2.42	1400	1200	159	136		
2L2.5	2x2.5	33	30	17	8.1	6.6	1.77	6.90	9.41	1.83	1100	1200	213	187		
2L4	2x4	44	40	10	9.4	7.7	2.25	4.31	12.15	1.42	800	1200	282	248		
3L1*	3x1	16.5	15	36	7.3	5.8	1.13	17.24	7.56	2.28	1500	1200	159	136		
3L1.5*	3x1.5	21	19	24	7.9	6.4	1.39	11.49	8.93	1.93	1100	1200	201	176		
3L2.5*	3x2.5	28	25	14	9.0	7.3	1.77	6.90	10.68	1.61	900	1200	256	223		
4L1*	4x1	16	14.5	36	7.8	6.3	1.13	17.24	8.78	1.96	1200	1200	187	162		
4L1.5*	4x1.5	21	19	24	8.5	7.0	1.39	11.49	10.21	1.69	900	1200	230	203		
4L2.5*	4x2.5	28	25	14	9.8	8.1	1.77	6.9	12.83	1.34	700	1200	313	277		
7L1	7x1	11	10	42	9.3	7.6	1.13	17.24	11.57	1.49	800	1200	269	236		
7L1.5	7x1.5	14	12.5	28	10.1	8.4	1.39	11.49	13.33	1.29	600	1200	332	295		
7L2.5	7x2.5	19	17	17	11.4	9.7	1.77	6.9	17.42	0.99	500	1200	454	411		
<b>HEAVY DUTY 750V GRADE</b>																
1H1.5*	1x1.5	33	30	21.8	6.2	4.9	1.39	11.49	5.78	2.98	1500	1200	117	97		
1H2.5*	1x2.5	43	39	13.5	6.6	5.3	1.77	6.90	6.44	2.68	1300	1200	137	116		
1H4*	1x4	56	51	8.3	7.2	5.9	2.25	4.31	7.70	2.24	1050	1200	170	146		
1H6*	1x6	69	63	5.6	7.7	6.4	2.75	2.87	8.93	1.93	1200	1200	206	180		
1H10*	1x10	90	81	3.6	9.0	7.3	3.57	1.72	10.68	1.61	950	1200	273	240		
1H16*	1x16	119	107	2.3	10.0	8.3	4.50	1.08	13.16	1.31	730	1200	361	326		
1H25*	1x25	154	139	1.5	11.3	9.6	5.66	0.69	16.96	1.02	540	1200	499	457		
1H35*	1x35	187	168	1.1	12.4	10.7	6.66	0.49	20.23	0.85	440	1600	632	585		
1H50*	1x50	230	207	0.87	13.8	12.1	7.75	0.34	24.73	0.70	350	1600	810	758		
1H70*	1x70	279	251	0.65	15.4	13.7	9.32	0.25	30.90	0.56	275	1600	1075	1016		
1H95*	1x95	333	300	0.53	17.7	15.4	10.98	0.18	36.69	0.47	220	1600	1413	1324		
1H120*	1x120	382	344	0.46	19.1	16.8	12.33	0.14	42.59	0.40	190	1600	1709	1612		
1H150*	1x150	431	388	0.42	20.7	18.4	13.70	0.11	49.48	0.35	155	1600	2055	1949		
1H185*	1x185	482	434	0.39	23.2	20.4	15.18	0.09	57.47	0.30	125	1600	2514	2370		
1H240*	1x240	537	483	0.36	26.1	23.3	17.33	0.07	69.39	0.25	99	1600	3213	3035		
1H300*	1x300	883	395	0.31	28.8	26.0	19.37	0.06	84.55	0.20	80	1800	3972	3791		
1H400*	1x400	1053	948	0.28	32.8	30.0	22.37	0.04	105.97	0.16	60	1800	5211	5004		
2H1.5	2x1.5	26	23.5	28	9.6	7.9	1.39	11.49	12.49	1.38	750	1200	272	237		
2H2.5	2x2.5	36	32	17	10.4	8.7	1.77	6.90	14.56	1.18	610	1200	314	276		
2H4	2x4	47	42	10	11.5	9.8	2.25	4.31	17.61	0.98	480	1200	397	355		
2H6	2x6	60	54	7	12.6	10.9	2.75	2.87	20.93	0.82	370	1600	493	446		
2H10	2x10	82	74	4.2	14.4	12.7	3.57	1.72	26.74	0.64	280	1600	673	619		
2H16	2x16	109	98	2.6	16.4	14.7	4.50	1.08	34.11	0.51	205	1600	912	850		
2H25	2x25	142	128	1.65	19.4	17.1	5.66	0.69	43.39	0.40	150	1600	1277	1178		
3H1.5*	3x1.5	22	20	24	10.0	8.3	1.39	11.49	13.62	1.27	670	1200	290	254		
3H2.5*	3x2.5	30	27	14	11.0	9.3	1.77	6.9	16.14	1.07	520	1200	364	323		
3H4*	3x4	40	36	9.1	12.1	10.4	2.25	4.31	19.34	0.89	420	1600	460	415		
3H6*	3x6	51	46	6	13.2	11.5	2.75	2.87	23.11	0.75	345	1600	575	526		
3H10*	3x10	69	62	3.6	15.3	13.6	3.57	1.72	30.28	0.57	245	1600	812	754		
3H16*	3x16	92	83	2.3	17.9	15.6	4.50	1.08	38.07	0.45	180	1600	1124	1034		
3H25*	3x25	120	108	1.45	20.5	18.2	5.66	0.69	47.37	0.36	135	1600	1549	1444		
4H1.5*	4x1.5	23	20.5	24	10.8	9.1	1.39	11.49	15.77	1.09	560	1200	345	305		
4H2.5*	4x2.5	30	27	14	11.8	10.1	1.77	6.90	18.47	0.93	445	1600	428	384		
4H4*	4x4	40	36	9.1	13.1	11.4	2.25	4.31	22.90	0.75	350	1600	556	507		
4H6*	4x6	51	46	6	14.4	12.7	2.75	2.87	26.74	0.64	270	1600	698	644		
4H10*	4x10	68	61	3.6	16.5	14.8	3.57	1.72	34.36	0.50	205	1600	974	911		
4H16*	4x16	89	80	2.3	19.6	17.3	4.50	1.08	44.42	0.39	148	1600	1386	1286		
4H25*	4x25	116	104	1.45	22.9	20.1	5.66	0.69	56.01	0.31	124	1600	1947	1805		
7H1.5	7x1.5	15.5	14	28	12.5	10.8	1.39	11.49	20.73	0.83	385	1600	479	432		
7H2.5	7x2.5	21	19	17	13.8	12.1	1.77	6.90	24.73	0.70	310	1600	611	559		
12H1.5	12x1.5	13	11.5	28	15.8	14.1	1.39	11.49	31.85	0.54	210	1600	772	712		
12H2.5	12x2.5	17	15.5	17	17.9	15.6	1.77	6.90	37.64	0.46	175	1600	1001	911		
19H1.5	19x1.5	11	10	28	18.9	16.6	1.39	11.49	41.59	0.41	150	1600	1088	992		

**Note:**

\*Current ratings and volt drop values are for 3 phase operation, single conductor cables installed horizontally spaced. All other values are for single phase operation.

SCREW ON SEAL 105°C		EXTERNALLY THREADED GLAND		MICC LSF COVERED CLIPS AND SADDLES				CABLE SIZE REFERENCE BARE CABLE CC LSF COVERED CCM
PLAIN SEAL	EARTH TAIL SEAL	FOR PLAIN SEAL	FOR EARTH TAIL SEAL	MICC CLIP		MICC SADDLE		
				BARE COPPER FOR BARE CABLES	LSF COATED FOR COVERED CABLES	BARE COPPER FOR BARE CABLES	LSF COATED FOR COVERED CABLES	
RPS	RPSL	RGM	RGM	RC	RCHL	RS	RSFL	FOLLOWED BY
<b>LIGHT DUTY 500V GRADE</b>								
2L1 20	2L1 20	2L1 20	2L1 20	20	26	202	272	2L1
2L1.5 20	2L1.5 20	2L1.5 20	2L1.5 20	22	28	222	302	2L1.5
2L2.5 20	2L2.5 20	2L2.5 20	2L2.5 20	26	32	272	342	2L2.5
2L4 20	2L4 20	2L4 20	2L4 20	30	37	302	382	2L4
3L1 20	3L1 20	3L1 20	3L1 20	22	28	242	302	3L1*
3L1.5 20	3L1.5 20	3L1.5 20	3L1.5 20	24	30	272	342	3L1.5*
3L2.5 20	3L2.5 20	3L2.5 20	3L2.5 20	28	34	302	342	3L2.5*
4L1 20	4L1 20	4L1 20	4L1 20	24	30	272	342	4L1*
4L1.5 20	4L1.5 20	4L1.5 20	4L1.5 20	28	34	302	342	4L1.5*
4L2.5 20	4L2.5 20	4L2.5 20	4L2.5 20	32	37	342	422	4L2.5*
7L1 25	7L1 25	7L1 25	7L1 25	30	37	302	382	7L1
7L1.5 25	7L1.5 25	7L1.5 25	7L1.5 25	32	40	342	422	7L1.5
7L2.5 25	7L2.5 25	7L2.5 25	7L2.5 25	37	43	382	462	7L2.5
<b>HEAVY DUTY 750V GRADE</b>								
1H1.5 20	1H1.5 20	1H1.5 20	1H1.5 20	20	26	202	272	1H1.5*
1H2.5 20	1H2.5 20	1H2.5 20	1H2.5 20	22	26	222	272	1H2.5*
1H4 20	1H4 25	1H4 20	1H4 25	22	28	242	302	1H4*
1H6 20	1H6 25	1H6 20	1H6 25	24	30	272	342	1H6*
1H10 20	1H10 25	1H10 20	1H10 25	28	34	302	342	1H10*
1H16 20	1H16 25	1H16 20	1H16 25	32	37	342	422	1H16*
1H25 20	1H25 32	1H25 20	1H25 32	37	43	382	462	1H25*
1H35 20	1H35 32	1H35 20	1H35 32	40	47	422	502	1H35*
1H50 25	1H50 40	1H50 25	1H50 40	47	54	502	542	1H50*
1H70 25	—	1H70 25	—	54	59	542	632	1H70*
1H95 25	—	1H95 25	—	59	67	632	702	1H95*
1H120 32	—	1H120 32	—	63	75	702	752	1H120*
1H150 32	—	1H150 32	—	71	79	752	812	1H150*
1H185 32	—	1H185 32	—	79	88	812	932	1H185*
1H240 40	—	1H240 40	—	88	101	932	1042	1H240*
For Information On Terminations & Fixings Please Contact Us.								1H300*
								1H400*
2H1.5 20	2H1.5 20	2H1.5 20	2H1.5 20	30	37	342	382	2H1.5
2H2.5 20	2H2.5 20	2H2.5 20	2H2.5 20	34	40	342	422	2H2.5
2H4 20	2H4 25	2H4 20	2H4 25	37	43	422	462	2H4
2H6 20	2H6 25	2H6 20	2H6 25	43	47	462	502	2H6
2H10 25	2H10 32	2H10 25	2H10 32	47	54	502	592	2H10
2H16 25	2H16 40	2H16 25	2H16 40	54	63	592	702	2H16
2H25 32	2H25 40	2H25 32	2H25 40	67	75	702	752	2H25
3H1.5 20	3H1.5 20	3H1.5 20	3H1.5 20	32	37	342	422	3H1.5*
3H2.5 20	3H2.5 25	3H2.5 20	3H2.5 25	37	43	382	462	3H2.5*
3H4 20	3H4 25	3H4 20	3H4 25	40	47	422	502	3H4*
3H6 25	3H6 25	3H6 25	3H6 25	43	51	462	542	3H6*
3H10 25	3H10 32	3H10 25	3H10 32	54	59	542	632	3H10*
3H16 25	3H16 40	3H16 25	3H16 40	59	71	642	752	3H16*
3H25 40	3H25 40	3H25 40	3H25 40	71	79	752	812	3H25*
4H1.5 20	4H1.5 20	4H1.5 20	4H1.5 20	37	43	382	462	4H1.5*
4H2.5 20	4H2.5 25	4H2.5 20	4H2.5 25	40	47	422	462	4H2.5*
4H4 25	4H4 25	4H4 25	4H4 25	43	51	462	542	4H4*
4H6 25	4H6 32	4H6 25	4H6 32	47	54	502	592	4H6*
4H10 25	4H10 32	4H10 25	4H10 32	54	63	592	702	4H10*
4H16 32	4H16 40	4H16 32	4H16 40	67	75	702	752	4H16*
4H25 40	4H25 40	4H25 40	4H25 40	79	88	812	932	4H25*
7H1.5 25	7H1.5 25	7H1.5 25	7H1.5 25	43	47	462	502	7H1.5
7H2.5 25	7H2.5 25	7H2.5 25	7H2.5 25	47	54	502	542	7H2.5
12H1.5 32	—	12H1.5 32	—	54	59	592	632	12H1.5
12H2.5 32	—	12H2.5 32	—	59	71	632	752	12H2.5
19H1.5 40	—	19H1.5 40	—	63	71	702	752	19H1.5

**Note:**

\*\*Current ratings and volt drop values are based upon tables 4J1A & 4J1B of the 16th edition of the IEE Wiring Regulations method 11 (cable on a perforated cable tray).



## STANDARD AND APPROVALS

MICC MI Wiring Cables are manufactured, tested and LPCB approved to BS EN 60702-1. The LPCB certification makes reference to the following standards:

BS EN 60702-1:2002 -Mineral Insulated cable and their terminations with a rated voltage not exceeding 750V

BS6387:1994-Performance requirements for cables required to maintain circuit integrity under fire conditions.

BS 5839-1: 2002+A2:2008 -Fire detection and alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance.

### Terminations

MICC terminations are tested in accordance with BS EN 60702-2:

### Quality Certification

Quality systems certificate No. 063 Assessed to ISO 9001:2008

### CE Mark

MICC cable drums, reels and termination packaging are marked with the CE mark as required by the directive, except for Terminations primarily intended for installation in potentially explosive atmospheres which are not marked, because the low voltage directive does not apply.



### Other Standards And Codes Of Practice Referring To MI Cables

**BS 8434** - Methods of test for assessment of the fire integrity of electric cables

**BS 6387** - 1994 Performance requirements for cables required to maintain circuit integrity under fire conditions.

**IEC 60331** - Test for electric Cables under fire conditions. Circuit integrity.

**BS EN 5588** - Fire Precautions in the design, construction and use of buildings.

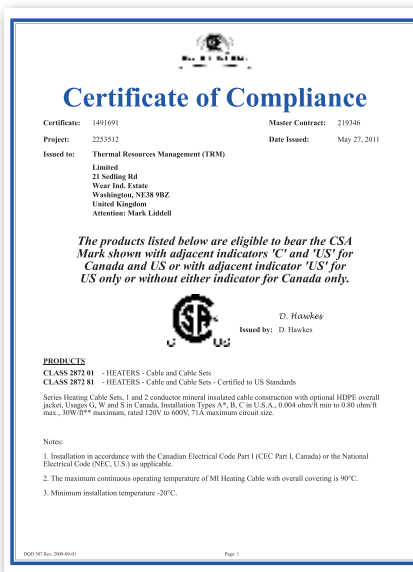
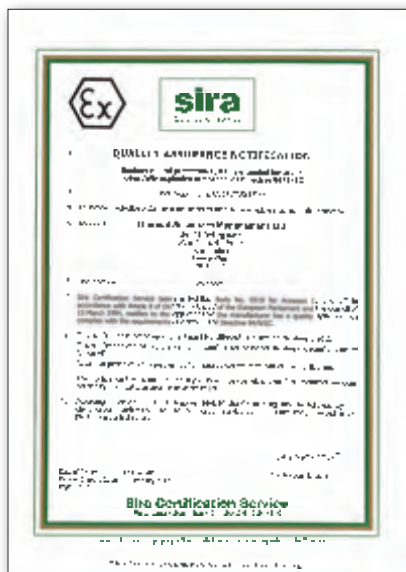
**BS 5839** - Fire detection and alarm systems in Buildings.

**BS EN 5266** - Emergency Lighting. Code of practice for the emergency lighting of premises.

**BS 7671: 2008** - Requirements for Electrical Installations. IEE Wiring Regulations.

**BS 60079** - Code of Practice for the selection, installation and maintenance of electrical apparatus for use in Potentially Explosive Atmospheres.

**London Underground** - Fire Survival Cable (MICC) EME-SP-14-028-A1



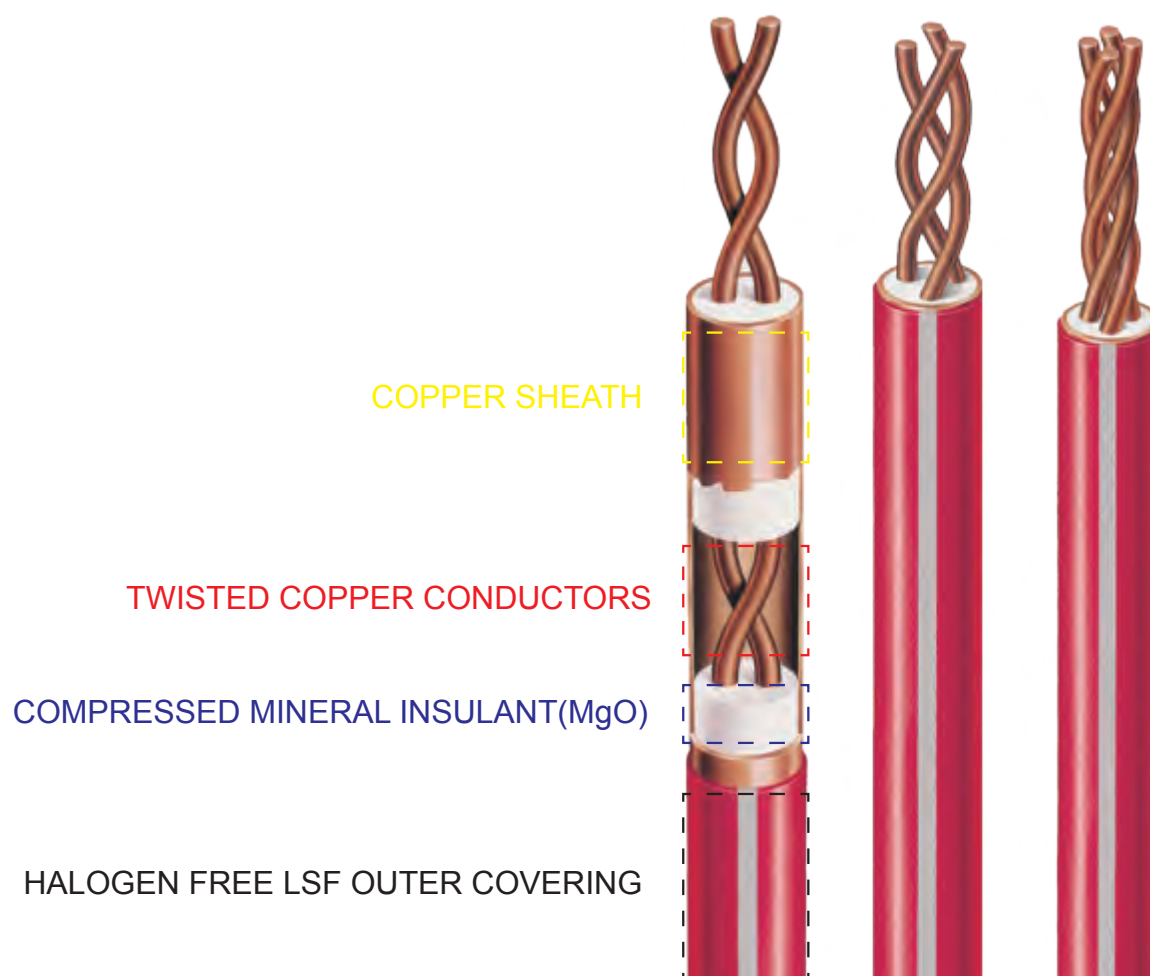


## MICC TWISTED COMMUNICATION CABLES

MICC twisted communication and signal cables have been developed to meet the stringent demands of modern life preservation systems. They are now being applied to communication and control circuits in aggressive and arduous environments where conventional communication cables are unable to perform reliably.

### Applications For Communication Cable

- Fire Management Systems.
- Building Management.
- Fire Telephones.
- Public Address.
- Close Circuit Television.
- Data Networks.



## Features

- Twisted Conductor Configuration.
- Solid Copper Screen.
- Fireproof. Easily surpasses categories CWZ of BS 6387: 1994.
- Outer Covering of halogen free Low Smoke and Fume (LSF).
- Available in Red, White, Orange, differentiated by two Grey sheath stripes.
- Standard terminations for the equivalent Light Duty cable size are used.

## Benefits

- Reduces the effect of Electromagnetic interference thus reducing signal corruption.
- Provides an excellent low impedance electrostatic shield reducing the possibility of system malfunction.
- Recognised as the optimum fire performance cable.
- Low smoke and acid gas emission, minimal smoke obscuration.
- Readily identifiable circuitry.
- Normal installation and termination procedures are followed.

REFERENCE CCM	2T1	2T1.5	2T2.5	2T4	3T1.5	4T1.5
Diameter over LSF covering mm	6.6	7.2	8.1	9.4	7.9	8.5
Diameter over copper screen mm	5.1	5.7	6.6	7.7	6.4	7
Conductor area mm <sup>2</sup>	1	1.5	2.5	4	1.5	1.5
Frequency of twist per metre	20	20	20	20	20	20
Voltage rating volts	500	500	500	500	500	500
Maximum conductor resistance at 20°C ohms/km	18.1	12.1	7.41	4.61	12.1	12.1
Typical screen resistance at 20°C ohms/km	3.2	2.7	2.1	1.6	2.2	1.9
Attenuation at 1 MHz db/100m	1.8	1.7	1.4	1.2	1.6	1.9
Attenuation at 10 MHz db/100m	5.7	5.6	5.3	4.4	5.3	6.2
Inductance at 10 kHz						
between adjacent conductors µH/km	510	440	410	360	460	460
between opposite conductors (4 core) µH/km	-	-	-	-	-	530
Nominal Capacitance at 1 kHz						
between adjacent conductors pF/m	150	183	210	235	175	210
between opposite conductors (4 core) pF/m	-	-	-	-	-	180
between conductor and screen pF/m	250	302	330	370	270	300
Characteristic impedance at 10 kHz						
adjacent conductors ohms	58	50	43	38	50	47
opposite conductors (4 core) ohms	-	-	-	-	-	54
NOTE:	Twisted cable is available on reels in 100m lengths-please consult us for longer continuous lengths					



## ACCESSORIES

### Termination

A complete termination comprises a seal to provide a means of electrical connection and a gland to secure the cable into the appropriate apparatus. Externally threaded brass compression glands are available with ISO metric threads as standard. Other thread forms are available on request.

Internally threaded 20mm ISO metric brass compression glands are available for the full range of 2, 3 and 4 conductor, 500 volt light duty cables.

There are brass seals for the entire cable range. These incorporate a variety of sealants and conductor sleeving to suit most applications and environments.



#### BRASS POT SEAL

Comprising:  
Threaded Brass Pot,  
Sealing Compound,  
Pot Closure,  
Insulating Sleeve.  
Fours sizes: 20mm,  
25mm, 32mm, 40mm.

#### GLAND SHROUD

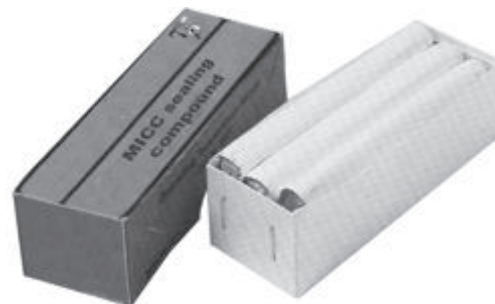
Fours sizes: 20mm, 25mm,  
32mm, 40mm.

#### BRASS COMPRESSION GLAND

Comprising:  
Backnut,  
Compression Ring,  
Gland Body.  
Fours sizes: 20mm, 25mm,  
32mm, 40mm.

### TRMX

Sealing compound for use in MICC Mineral Insulated Wiring-Lead-In Cable terminations to prevent moisture ingress. Continuous operating temperature range  $-80^{\circ}\text{C}$  to  $105^{\circ}\text{C}$ . For any high operating temperature applications, please contact us.

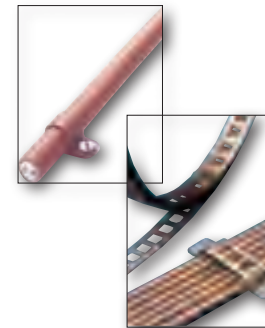




### Clips and Straps

Clips to secure a single copper-sheathed MI cable directly to mounting surface. For cables up to 20mm diameter.

Straps to secure two copper-sheathed MI cables directly to mounting surface. For cables up to 20mm diameter.



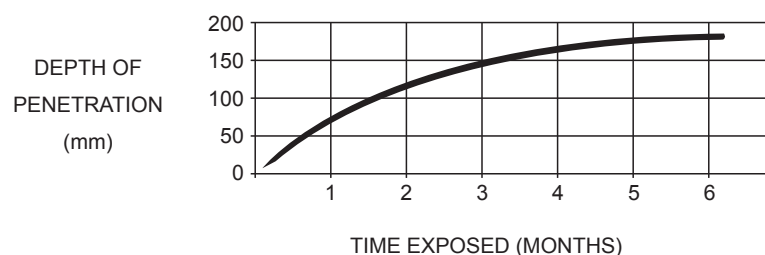
### MICC Recommended Fixing Distances

The fixing distances shown in the table below represents a saving of up to 45% in comparison with traditional methods of installation practice, where MI cables are fixed at an average of 225mm intervals compares to the MICC recommendation of 400mm centres.

Fixing Distances- Vertical or Horizontal				
Cable Diameter	Surface	On Cable Tray	Behind Plaster	In Roof Space Or Suspended Ceiling
Up to 9mm	600mm	850mm	650mm	600mm
9mm~20mm	650mm	1000mm	-	800mm
Over 20mm	700mm	1200mm	-	1000mm

### Self-sealing Powder

All mineral insulated cables using MgO are hygroscopic (they have an affinity for moisture). This degrades the insulation resistance and normally requires site procedures in order to regain a high insulation resistance when sealing the cable. MICC has developed a combination of powders which provide a moisture blocking characteristic. This means the cable can be left open for a period of time without any significant moisture penetration. In fact upon sealing, the small amount of moisture which may have entered the cable will disperse and the insulation resistance will recover to high levels after 24 hours.





## ALLOY 825 SHEATHED FIRE-PROOF WIRING CABLE

Mineral insulated fire-proof wiring units and cables manufactured by MICC group of companies are made up of a metal conductor embedded in a compacted Magnesium oxide (inorganic) insulant inside a metal sheath.

The inorganic nature of the construction enables the cables to operate at high temperatures for long periods of time in extremely harsh environments e.g. petro-chemical, reactor vessels and other applications where the integrity of the cable is most important.



### Operating Temperatures:

Continuous exposure temperature

Bare cable: up to 670°C

Cable with PVC or LSF covering: up to 105°C

Maximum exposure temperature: 1095°C.

Cables can be joined by joints that also withstand direct fire temperature 1095°C for 30 minutes without circuit failure.

### Construction:

Sheath material:

Alloy 825

Number of conductors: from 1 up to 8

Conductor material: Nickel clad Copper, Nickel

Insulation material: Magnesium Oxide (MgO)

Single conductor	Two conductors	Three conductors	Four conductors	Seven conductors	Eight Conductors
------------------	----------------	------------------	-----------------	------------------	------------------

### Termination Construction

Gland fitting: Stainless steel

Potting material: Epoxy resin

Tails: Standard solid tail length 250 mm

**Electrical Parameters:**

Supply voltage up to 750VAC (cable)

Approvals:

ISO 9001-2008

Certificate No: 031422-1 (TRM Ltd), 031422-2 (MICC Ltd)

**Wiring Cables Termination and Joints**



Without joint



With joint

**Wiring Cable Metric Range reference**

Description	W	825	-	2	H	10	CN	-	PVC-RED
Category	"W" – Wiring /Cold Lead-in cable								
Sheath material	825 – Alloy 825								
Number of conductors	1 – One conductor 2 – Two conductors 3 – Three conductors 4 – Four conductors 7 – Seven conductors 8 – Eight conductors								
Voltage Rating	"H" – Heavy duty 750V "L" – Light duty 500V								
Conductor cross section area	Cross section area of a single conductor								
Conductor material reference	"CN" – Nickel clad Copper "Ni" – Nickel								
Suffix for additional features such as colour coding serving	"LSF" – for LSF "PVC- RED" for red PVC etc.								



## Alloy 825 sheathed Fire-Proof Wiring Cable with Nickel Clad Copper conductors 750V Range

Cable Reference	Cable diameter over metal sheath	No. of conductors	Copper cross section area	Conductor diameter	Current Rating1	Current Rating2	Voltage drop per A per m	Cable weight	Plain seal	Earth tail seal
Bare	mm		mm <sup>2</sup>	mm	A	A	mV	Kg/km	mm	mm
W825-1H1.5CN*	5.70	1	1.5	1.58	27	24	37	73	20	20
W825-1H2.5CN*	6.30	1	2.5	2.03	38	35	25	95	20	20
W825-1H4.0CN*	6.60	1	4.0	2.57	47	43	9.4	115	20	20
W825-1H6.0CN*	7.30	1	6.0	3.14	61	55	6.2	150	20	25
W825-1H10CN*	8.30	1	10.0	4.06	92	83	3.7	212	20	25
W825-1H16CN*	9.60	1	16.0	5.13	124	111	2.4	308	20	25
W825-1H25CN*	11.40	1	25.0	6.41	164	179	1.5	454	25	25
W825-1H35CN*	12.70	1	35.0	7.59	199	179	1.1	596	25	32
W825-2H1.5CN	9.30	2	1.5	1.58	28	25	29	186	20	25
W825-2H2.5CN	10.10	2	2.5	2.03	38	33	18	231	20	25
W825-2H4.0CN	11.40	2	4.0	2.57	49	44	10	309	25	25
W825-2H6.0CN	12.70	2	6.0	3.14	63	57	7.2	400	25	32
W825-2H10CN	14.80	2	10.0	4.06	86	77	4.3	577	25	32
W825-3H1.0CN*	9.10	3	1.0	1.28	19	17	37	179	20	20
W825-3H1.5CN*	9.60	3	1.5	1.58	23	21	25	209	20	32
W825-3H2.5CN*	10.70	3	2.5	2.03	31	28	14	276	20	32
W825-3H4.0CN*	12.10	3	4.0	2.57	42	38	9.4	373	25	40
W825-3H6.0CN*	13.60	3	6.0	3.14	54	49	6.2	498	25	32
W825-3H10CN*	15.60	3	10.0	4.06	71	64	3.7	708	25	40
W825-4H1.5CN*	10.70	4	1.5	1.58	24	22	25	263	20	32
W825-4H2.5CN*	12.10	4	2.5	2.03	32	29	14	358	25	40
W825-4H4.0CN*	13.60	4	4.0	2.57	43	39	9.4	480	25	32
W825-4H6.0CN*	14.80	4	6.0	3.14	53	48	6.2	611	25	32
W825-4H10CN*	17.30	4	10.0	4.06	71	64	3.7	894	32	40
W825-7H1.5CN	12.70	7	1.5	1.58	16	15	29	388	25	32
W825-7H2.5CN	14.70	7	2.5	2.03	23	21	18	551	25	40
W825-7H4.0CN	16.60	7	4.0	2.57	26	23	10	750	40	-

## Alloy 825 sheathed Fire-Proof Wiring Cable with Nickel conductors 750V Range

Cable Reference	Cable diameter over metal sheath	No. of conductors	Copper cross sectional area	Conductor diameter	Current Rating1	Current Rating2	Voltage drop per A per m	Cable weight	Plain seal	Earth tail seal
Bare	mm		mm <sup>2</sup>	mm	A	A	mV	Kg/km	mm	mm
W825-2H1.5Ni	7.9	2	1.5	1.38	10.0	9.1	156.8	135	20	20
W825-2H2.5Ni	8.7	2	2.5	1.78	13.9	12.4	95.0	173	20	20
W825-2H4.0Ni	9.8	2	4.0	2.26	18.2	16.3	55.8	230	20	25
W825-2H6.0Ni	10.9	2	6.0	2.76	23.2	20.9	39.0	299	20	25
W825-3H1.5Ni*	8.3	3	1.5	1.38	8.5	7.7	134.4	157	20	20
W825-3H2.5Ni*	9.3	3	2.5	1.78	11.6	10.4	78.2	209	20	25
W825-3H4.0Ni*	10.4	3	4.0	2.26	15.5	13.9	50.8	279	20	25
W825-3H6.0Ni*	11.5	3	6.0	2.76	19.7	17.8	33.5	365	25	25
W825-3H10Ni*	13.6	3	10.0	3.57	26.7	24.0	20.1	541	25	32
W825-4H1.5Ni*	9.1	4	1.5	1.38	8.9	7.9	134.4	193	20	20
W825-4H2.5Ni*	10.1	4	2.5	1.78	11.6	10.4	78.2	256	20	25
W825-4H4.0Ni*	11.4	4	4.0	2.26	15.5	13.9	50.8	347	25	25
W825-4H6.0Ni*	12.7	4	6.0	2.76	19.7	17.8	33.5	457	25	32
W825-4H10Ni*	14.8	4	10.0	3.57	26.3	23.6	20.1	669	25	32
W825-7H1.5Ni	10.8	7	1.5	1.38	6.0	5.4	156.8	285	25	25
W825-7H2.5Ni	12.1	7	2.5	1.78	8.1	7.3	95.0	388	25	25
W825-7H4.0Ni	13.6	7	4.0	2.26	9.1	8.1	55.8	528	25	32
W825-8H4.0Ni	16.20	7	4.0	2.26	6.6	6.0	56.0	697	40	-



## PROJECT REFERENCES



### Buildings and Plaza

Ocean Building	Singapore
Imbi Plaza	Indonesia
Time Square	Hong Kong
Kingkey Finance Center Plaza	China
Houses of Parliament	United Kingdom



### Tunnels

Paris Metro	France
London Underground	United Kingdom
Tyne Tunnel	United Kingdom
Singapore Metro	Singapore
Taipei Metro	Taiwan
Montreal Metro	Canada
Kai Tak Tunnel	Hong Kong
Hangzhou Tunnel	China



### Hospitals

Papworth-Huntington	United Kingdom
Riyadh University	Saudi Arabia
Teaching Hospital	Hong Kong



### Airport

Heathrow International Airport	United Kingdom
Newcastle International Airport	United Kingdom
Frankfurt International Airport	Germany
Charles de Gaulle International Airport	France
Changi International Airport	Singapore
Shenzhen Baoan International Airport	China
Kuwait International Airport	Middle East
Dubai International Airport	Middle East
Narita International Airport	Japan
HongKong International Airport	Hong Kong



## Hotels

Royal Station Hotel	United Kingdom
Marco Polo	Singapore
Sheraton	Qatar
Hilton	China



## Power Generation and Nuclear

Heysham	United Kingdom
Cockenzie	United Kingdom
Drax	United Kingdom
Dubai "G" Station	Dubai
Ras Abu Fontas	Qatar
Trombay	India
Tockai Marn	Japan



## Oil and Gas Production

SINOPEC	China
BP	Forties
Shell	Canada
Shell	America
Esso	Dunlin
Elf	Erigg
Chevron	Ninian



## Others

Ras Abu Foutas	Qatar
Castle Peak	United Kingdom
Doha east and west	Kuwait
Shell	Holland
ICI	United Kingdom
BP	Holland
Golden Eagle	Canada
Aramco	Saudi
Neste	Finland
ADNOC	Saudi
National Bank	Malaysia
Motor Engine Plant	Wales



## Mineral Insulated Cable Co., Ltd.

Add: Temperature House, 21 Sedling Road,  
Wear Industrial Estate, Washington,  
Tyne & Wear, NE38 9BZ, United Kingdom

Tel: +44 191 416 7777

Fax: +44 191 419 2345

URL: [www.miccgroup.com](http://www.miccgroup.com)

## MICC (Shanghai) Electric Co., Ltd.

Add: Room 809-810, No.2 Building,  
100 Qinzhou Road, Shanghai, PRC

Zip: 200235

Tel: +86 21 51691990

Fax: +86 21 52288095

Web: [www.miccgroup.com](http://www.miccgroup.com)